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Original articles – Obstetrics

Women's attitudes to and perceptions of oral health and dental care during pregnancy

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Abstract

Aims: To assess pregnant women's opinions on and perceptions of oral health and their relationship to oral hygiene and dental care practices.
Methods: Questionnaire survey on perceived oral health, oral hygiene and utilization of dental services among 649 nulliparae attending for antenatal care at all public antenatal clinics in Adelaide, South Australia.
Results: Women rated their general health significantly better than their oral health ($P<0.001$) and attributed more importance to healthy teeth for their baby than for themselves ($P<0.001$). Only 35% had dental care during pregnancy; 35% had no dental visit for at least two years and 27% reported cost as a major deterrent. Eighteen percent had experienced gingival bleeding before pregnancy and 41% during pregnancy. Gingival bleeding outside pregnancy was clearly related to perceived oral health ($P<0.001$), but this was less so for bleeding during pregnancy. The latter was not related to age, level of education, employment, marital status, or smoking habits. Only 38% of women with gingival bleeding in pregnancy had a dental care visit in pregnancy and 28% considered their oral health as very good.
Conclusions: Many pregnant women do not perceive gingival bleeding as indicating inflammatory disease and seek no professional help for it. Maternity care providers need to devote more attention to oral health in antenatal clinics and antenatal education.

Keywords: Dental care; gingivitis; maternal behavior; oral health; oral hygiene; periodontal disease; prenatal care; questionnaire survey; smoking; women's opinions.

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Introduction

Folk wisdom has linked dental health with childbirth for time immemorial. ''A tooth for a child'' has an equivalent in many languages [6]. Its implication is that the demands of pregnancy include the loss of a tooth, with some studies showing an inverse relationship in older women between their number of teeth and their number of children [6]. Association does not mean causation, and the concept that dental minerals are recycled to benefit fetal bone formation was put to rest long ago [22], but many women apparently still believe this [16]. Yet, for about a decade now [39], the proverb has been twisted around. Pregnancy may endanger teeth far less than teeth and their periodontal environment in particular, may endanger pregnancy [8, 48, 54]. There is also conclusive evidence now that transmission of cariogenic microbes from mother to child, even before tooth eruption, is a crucial element in the development of caries in their children [49, 50], with serious consequences for their well-being [14].

Periodontal disease is a general term for inflammatory conditions affecting the gingiva and the supporting connective tissue and alveolar bone. These are commonly divided into those involving only the gingiva (gingivitis) and those extending into the underlying structures affecting the periodontal ligament and alveolar bone (periodontitis) [37, 52]. Both conditions are common in pregnancy. The reported prevalence of gingivitis, long known to be more frequent in than outside pregnancy [37], ranges from 30% to 100%, depending, among others, on age, race and socio-economic status [22, 28]. Prevalence of the more serious periodontitis ranges from 5% to 20% [22, 30, 33, 37] with about 25% of women showing a worsening periodontal condition during pregnancy [33], but even higher rates have been reported in women with preterm birth [12, 19, 41]. The prevalence of moderate to severe periodontitis in women of childbearing age in Australia ranges from 2.7% in those under 25 years of age to 14.5% in those aged 35 years or more [43].

In 1996, Offenbacher et al. [39] first reported an association between periodontal disease and preterm and/or low birth weight. Some studies could not corroborate this [4, 10, 20, 29, 30, 42], but case-control and cohort studies in several countries currently support an association with preterm birth, low birth weight or both [12, 19, 24, 31, 32, 41]. Several plausible pathogenic mechanisms have been proposed to support the relationship [36, 38]. Nonetheless, differences in case definitions, diagnostic criteria and their ascertainment [53], and numerous confounders associated with both oral health and preterm birth, make it difficult to evaluate the meaning and strength of the associations. The same applies

to the more recently described link between periodontitis and preeclampsia [3, 8].

As gingivitis is reversible and periodontitis largely preventable by good oral hygiene [37, 52], we investigated perceived oral health, oral hygiene and use of dental services in nulliparas recruited into a study of early childhood caries prevention. This randomized controlled trial showed clear benefits from preventative guidance during and after pregnancy in preventing early childhood caries [40]. Thence, women's opinions and perceptions of their oral health are important when planning interventions to address an issue that may improve both maternal and infant health [8, 40, 48, 54].

Methods

In 2002, we sought to recruit pregnant women into a randomized trial of an educational program to prevent early childhood caries. Nulliparous women were approached in antenatal clinics conducted at all five public maternity units in Adelaide, South Australia, with a population of about one million. Recruitment with signed informed consent was conducted by one of us [KP] at these hospitals all of which had given ethical approval for the study. Eligibility criteria were nulliparity, singleton pregnancy, proficiency in English, ability to provide a contact address for the next 24 months, and willingness to have the baby undergo a dental examination at 18–20 months of age.

At recruitment, women were asked to complete a questionnaire on their general and oral health, oral hygiene, demographic characteristics, and dental care and to complete a well-established dental anxiety scale [9]. Women rated their general and oral health on a six point scale from excellent to very poor with the two extreme values added to their next category for data analysis. Perinatal outcome data were obtained from pregnancy records, but the study was not conducted to examine a relationship with pregnancy outcomes. Power calculation was based on the expected frequencies of early childhood caries in the intervention and control groups [40]. Data from the 'maternal oral health survey' questionnaires at study entry, which were only analyzed after completion of the randomized trial [40], form the basis of the current report.

Comparisons between groups were assessed by χ^2-tests and interdependency by multivariable logistic regression analysis using SPSS version 15.0.

Results

Of 793 eligible nulliparous women approached in the antenatal clinics, 649 (81.8%) agreed to participate. They represent one-fifth of nulliparous women giving birth at the public hospitals over that period [40]. Their average age was 25.4 ± 5.7 (SD) years with 17.7% under 20 years (Table 1). Most were Australian born (82.3%) and Caucasian (86.1%) with only 2.5% of indigenous (Aboriginal or Torres Strait Islander) origin. This compares with 84.8% Australian born, 90.9% Caucasian and 2.5% Indigenous women giving birth in South Australia in 2002 [5].

Women rated their general health substantially better than their oral health ($P < 0.001$; Table 2). They also rated healthy teeth as more important for their baby than for themselves. Eighty percent considered it very important to keep their natural teeth, while 94.7% considered healthy teeth in the baby as very important ($P < 0.001$).

Eighteen percent reported gingival bleeding before pregnancy increasing to 41.3% in pregnancy without significant difference between smokers and non-smokers (43.1 vs. 37.7%) and no statistical differences related to age, country of origin, marital status, level of education or employment. As might be expected, the further in pregnancy the more

Table 1 Descriptive data for the 649 women in the study.

Characteristic	Percent
Maternal age	
<20 years	17.7
≥35 years	6.9
Australian born	82.3
Ethnicity	
Caucasian	86.1
Aboriginal	2.5
Asian	4.1
African	0.2
Other/unknown	7.3
Highest completed education	
Primary	37.9
Secondary	40.1
Tertiary	22.0
Occupation	
In workforce	50.0
Student	13.4
Marital status	
Married/de facto	73.2
Single/separated	23.6
Not stated	3.2
Body mass index	
≥25	31.3
≥30	12.3
Smoking	
Ever smoked	61.0
During pregnancy	27.2
Alcohol use in pregnancy	10.0
Planned pregnancy	54.2
First antenatal visit <14 weeks	55.5
Gestational age at recruitment	
<14 weeks	8.3
14–27 weeks	47.5
≥28 weeks	44.2

Table 2 Summary data on the relation between women's reported general health and oral health.

Self-rated as	General health		Oral health*	
	n	%	n	%
Very good	357	55.3	206	31.9
Good	204	31.6	198	30.7
Average	81	12.5	205	31.7
Poor	4	0.6	37	5.7

*Statistical difference with general health ratings: $P < 0.001$.

Table 3 Frequency (%) of gingival bleeding before and during pregnancy according to gestational age at recruitment, how women rated their oral health and whether they had a dental visit (actual or planned) in pregnancy.

	Percentage with gingival bleeding		No gingival bleeding in pregnancy (n=381)
	Before pregnancy (n=114)	In pregnancy (n=268)	
Self-rated oral health			
Very good	8.3	36.4	63.6
Good	13.1	38.4	61.6
Average	26.8	46.8	53.2
Poor	43.2	56.8	43.2
Dental visit in pregnancy			
Yes	22.1	39.2	60.8
No	15.4	44.7	55.3
Gestational age at recruitment			
1st trimester	11.1	24.1	75.9
2nd trimester	18.2	36.4	63.6
3rd trimester	18.5	49.8	50.2
All women	17.7	41.3	58.7

likely women were to report gingival bleeding in pregnancy. This increased from 24.1% among the 8.3% of women recruited in the first trimester (Table 1) to 49.8% among those in the third trimester (Table 3). Women who brushed their teeth at least twice a day were less likely than others to have gingival bleeding before pregnancy (14.1% vs. 22.7%; P=0.005), but that difference disappeared entirely during pregnancy with 41% of both groups reporting gingival bleeding. Even 34.8% of women, who brushed their teeth more than twice a day (7.1%), reported gingival bleeding in pregnancy. Whilst there was a strong relationship between gingival bleeding outside pregnancy and women's perceived oral health, this was far less so for gingival bleeding during pregnancy (Table 3). Nevertheless, a significant relationship remained with an adjusted odds ratio (OR) of 1.45 [95% confidence interval (CI): 1.17–1.79] after controlling for maternal age, smoking, gestational age, and oral health practices, including dental visits.

Only 41.7% had a regular dentist; 35.3% could not recall a dental visit in the last two years and 7.2% knew that their last visit was >5 years ago. Also, 23.6% of last dental visits had been to fix a problem rather than for a check-up. At recruitment, only 14.6% had visited a dentist during pregnancy and a further 20.2% had plans to do so. Because of variation in gestational age at recruitment (Table 1) these have been combined in Table 3, showing that women with and without gingival bleeding were equally likely to have a dental visit in pregnancy. The overall percentage of women with a dental visit in pregnancy (34.8%) dropped to half (17.8%) among women without dental visit in the last two years. In multivariable analysis, only having a regular dentist (OR: 2.22; 95% CI: 1.51–3.26) and regular use of dental floss (OR: 1.57; 95% CI: 1.05–2.33), but not gingival bleeding (OR: 1.24; 95% CI: 0.86–1.78) or perceived oral health (OR: 1.08; 95% CI: 0.91–1.28), were associated with visiting a dentist during pregnancy.

When assessing barriers to professional dental care in pregnancy, only 9.6% showed high and 13.6% high or medium anxiety on Corah's dental anxiety score [9], but 11.7% reported that fear had often caused them to postpone appointments (Table 4). Twice as many (26.9%) had delayed visits because of cost, a disincentive mentioned by 35% of women with no visit for at least two years, but also by 22.1% of those with planned or actual visits in pregnancy.

Table 5 shows differences in women's reported oral hygiene and dental care practices in relation to how they rated their oral health. Whilst perceived oral health showed a clear relationship with the frequency of tooth brushing and the use of dental floss (Table 5) and also with gingival bleeding before pregnancy (Table 3), it was far less affected by whether or not there was gingival bleeding during pregnancy (Table 3). Women reporting very good oral health were more likely to have a regular dentist, but the interval since the last dental visit or having a dental visit during pregnancy was not related to perceived oral health (Table 5).

Discussion

Considering the importance currently attached to periodontal health and its relation to pregnancy outcome [8, 48, 53, 54],

Table 4 Self-reported barriers to dental care.

Barrier	Percent
No private dental care insurance	82.4
High or medium anxiety on Corah's anxiety score [9]	13.6
Delaying dental appointments because of	
Fear	
Never	66.7
A few times	21.7
Nearly every time	11.7
Cost	
Never	40.7
A few times	32.4
Nearly every time	26.9

Table 5 Oral health practices in relation to self-rated oral health.

Oral health practice	Percentage among women rating oral health as			Percentage among all women	P-value*
	Very good	Good	Average/Poor		
Daily tooth brushing ≥twice	66.7	55.6	47.4	56.2	<0.001
Use of fluoride toothpaste	95.1	92.4	90.8	92.7	n.s.
Use of dental floss	34.6	28.3	19.8	27.1	0.002
Use of mouth rinse	23.6	20.0	16.8	19.9	n.s.
Have a regular dentist	50.8	46.4	30.3	41.7	<0.001
Dental visit in pregnancy	34.5	34.3	35.5	34.8	n.s.

*n.s. = not statistically significant.

there are not many published data on pregnant women's perceptions of their oral health and oral health related practices, and with few exceptions [11, 18, 46] most are confined to the dental medicine literature [1, 7, 13, 15–17, 25, 27, 44]. The same applies to information that women receive about oral health in pregnancy. In Japan the pregnancy record, under auspices of its Ministry of Health, has a full page on maternal dentition [34], but this is not so in most other countries. Some European countries provide free dental care during pregnancy, but it would seem that pregnant women are not necessarily aware of this [11, 18, 44].

The utilization of dental services in pregnancy by only 36% of Australian nulliparas is consistent with the 30% reported from a postpartum survey of Australian women, 80% of whom had completed secondary or higher education, giving birth at a single institution [46]. Data from other countries show a wide variation. Even among countries, such as Greece and the UK, which, unlike Australia, provide free dental care to pregnant women, rates range from 27% in Northern Greece [11] to between 33% and 64% in different regions of the UK [18, 23, 44], with countries such as Finland [35], Germany (49%) [15] and Kuwait (52%) [17], situated somewhere in between. These all seem to be in sharp contrast with data from Denmark where 88% of pregnant women reported at least one visit a year for the last five years [7]. However, that study [7] also noted that only 16% of pregnant women, who perceived signs of gingival inflammation, would visit a dentist for it, suggesting that there may be large differences between dental visiting patterns in and outside pregnancy. Data from the USA would seem to corroborate this, as 70% of pregnant women in 1999 and 2002 had received dental care in the previous 12 months [47], whereas studies on dental care during pregnancy report much lower rates, ranging from 23% to 49% [13, 16, 25, 27, 45]. Also a study of commercially insured women in the USA found a lower use of dental services, albeit not of preventative care, during than before or after pregnancy [21]. In our study, there was no relationship between women's perception of their oral health and whether or not they had a dental visit in pregnancy, although women reporting very good oral health were more likely to have a regular dentist.

It would seem that many pregnant women do not view gingival bleeding as a sign of inflammation, or at least not as a problem that requires attention. In our study, these women were not more likely to visit a dentist than other pregnant women and 36.4% stated to have very good oral health. This is not dissimilar to findings elsewhere [7, 11, 18, 46]. Christensen et al. [7], reporting on a Danish population with substantially higher rates of regular dental care than our study population, noted that 73% of pregnant women who perceived signs of gingival inflammation would take no action while only 16% would visit a dentist for it. It would seem that pregnant women almost everywhere are receiving the message that bleeding gums are a physiological phenomenon of pregnancy. It is possible that pregnant women view teeth and gum problems as entirely separate issues, but some studies also indicate that nearly half of the pregnant women with dental problems sought no dental care for them [15, 25] or postponed this until after the pregnancy [11].

Not fear, but cost was the main disincentive to seek dental care in our population. It applied to 27% of women receiving public maternity care and even to 22% of those with dental visits in pregnancy. The same disincentive has been reported in studies from the USA [16, 45, 47]. If up to 18% of preterm births could be prevented by dealing with periodontal disease in pregnancy, as some have suggested [37], providing such care free of charge could be economical in alleviating the cost of preterm birth to society [26].

The overwhelmingly consistent message from our study and from the literature on utilization of dental services is the considerable scope for improving pregnant women's understanding of oral health [1, 7, 11, 13, 15–17, 25, 27, 44, 46]. Having services freely available may not help when women do not know this [11, 18], do not use them because they perceive no problem [7, 15], do not feel it necessary [15, 16, 44] or believe that dental work should be avoided in pregnancy [11, 35]. However, the main prevention is not in the utilization of dental services but in improving self-care. Watt and Marinho [51], who reviewed the evidence on educational interventions to reduce plaque and gingival bleeding in various populations, concluded that the interventions were generally more effective in the short-term, up to six months, than in the long-term. Nevertheless, months instead of years may be sufficient for pregnancy, particularly when reinforced with the motivation that it can improve outcome for the child.

Finally, pleas for increased awareness of oral health in pregnancy, while reiterated throughout the dental medicine literature [1, 2, 7, 13, 15–17, 25, 27, 44] and increasingly also in the obstetric literature [11, 46], are likely to have little effect, if they only reach dental care providers and the

relatively small proportion of women who already use their services in pregnancy. Similarly, pleas for pre-conception dental care are unlikely to be effective if, as was the case in our study population, nearly half of pregnancies are unplanned. If any impact is to be expected, it will need to come from sensitizing maternity care providers to the issue and from their ability to address it in antenatal clinics, pre-pregnancy counseling and antenatal education.

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